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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Setsuo Nakajima

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EXAMINER

RAO, SHRINIVAS H

ART UNIT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/752,993	Applicant(s) NAKAJIMA, SETSUO	
	Examiner STEVEN H. RAO	Art Unit 2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 October 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4,6-10,12-16,18-22,24-28,30-34 and 36-100 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) 1-4,6-10,12-16,18-22,24-28,30-34 and 36-54 is/are allowed.
- 6) ☐ Claim(s) 55-91 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) 92-98 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>10/27/2008</u> | 6) <input type="checkbox"/> Other: _____ |

Response to Amendment

Applicants' amendment filed on 10/27/2008 has been entered and forwarded to the examiner on 10/29/2008.

Election/Restrictions

It is noted that Applicants' have not cancelled withdrawn claims 92-98 and not responded to the election by original presentation required in the previous action. Therefore applicants' response of 10/27/2008 is technically Non-responsive and need not be entered, however to move the case forward it is considered. Future responses without addressing this issue may not be entered.

Information Disclosure Statement

The IDS filed on 10/27/2008 has been considered and the initialed PTO-1449 made of record in the E-Red folder.

Allowable Subject Matter

Claims 1-4,6-10,12-16,18-22,24-28,30-34,36 -54 and 99-100 are allowed.

The applied prior art of record taken either singularly or in combination fails to anticipate or fairly suggest the limitation of the dependent claims, in such manner that a rejection under 35 U.S.C. 102 or 103 would be proper. The prior art fails to teach a combination of all the claimed features as presented in independent claim/s (1,7,13,19, 25 and 31)including the steps of, "forming a semiconductor film over an insulating surface.., forming an oxide film on the semiconductor film.., radiating the semiconductor film with a first laser beam

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using a lens., radiating the semiconductor film with a second laser beam after radiating with the first laser beam., radiating the semiconductor film with a third laser beam after radiating with the second laser beam., wherein a wavelength of the second laser beam and a wavelength of the third laser beam are different from a wavelength of the first laser beam". (as stated in Applicants' remarks [amdt.6/28/2007] pages 1, 17-18 and page 15). See also Terminal Disclaimer over 6,706,568.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 55 to 91 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nita et al. (U.S. Patent No. 6,304,329 herein after Nitta) and in view of Sasaki et al. (U.S. Patent No. 5,213,654 herein after Sasaki) and Mitnaga et al. (U.S. Patent No.

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5,808,321, herein after Mitnaga). (for response to Applicants' arguments see section below).

With respect to claims 55 Nitta describes a method for manufacturing a semiconductor device comprising: forming a crystalline semiconductor film over an insulating surface (Nitta col. 9 lines 2-3, SOI) ;irradiating the crystalline semiconductor film with a laser beam (Nitta col. 12 line 63).

Nitta does not specifically mention laser irradiation in a gas selected from at least one of a hydrogen and an inert gas.

Sasaki, a patent from the same field of endeavor describes in col. 3 lines 35-37 describes laser irradiation in a gas selected from at least one of a hydrogen and an inert gas to control growth temperature and thus control thickness of the film grown to a monatomic scale.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to Include Sasaki's gas selected from at least one of a hydrogen and an inert gas in Nitta's method of unspecified irradiating the crystalline semiconductor film with a laser beam. The motivation for the above combination is to control growth temperature and thus control thickness of the film grown to a monatomic scale. (Sasaki col. 2 lines 60-65).

The remaining limitation of claim 55 :

to level a surface of the crystalline semiconductor film.

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Nitta and Sasaki describe the semiconductor device of claim 1, but does not specifically mention its laser treatment is for the purpose of forming a crystallized semiconductor film.

Mitanaga a patent from the same filed of endeavor, describes in col. 1 lines 20-25, 45-47 etc. describe wherein the radiating the semiconductor film with the first laser beam is held in order to form a crystallized semiconductor film, to crystallize the film at low temperature so as to avoid substrate deformation and reduce the heating time from several ten hours or more necessary for crystallization to about an hour and produce a product having the desired properties.

Therefore it would have obvious to one of ordinary skill in the art at the time of the invention to use Mitnaga's laser annealing in Nitta's method. The motivation for which is to crystallize the film at low temperature so as to avoid substrate deformation and reduce the heating time from several ten hours or more necessary for crystallization to about an hour and produce a product having the desired properties. (Mitnaga col. 2 lines 10-18 ,etc.).

With respect to claims Nitta 56,77 and 83, describes the method for manufacturing the semiconductor device according to claim 55, wherein the inert gas is selected from the group consisting of nitrogen, argon, helium, neon, krypton and xenon. (Sasaki col. 2 lines 60-65).

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With respect to claim 57 Nitta describes the method for manufacturing the semiconductor device according to claim 55, wherein the crystalline semiconductor film is a silicon film or a SiGe (0 x 1)film. (Mitinaga -summary of the invention section).

With respect to claim 58,78 and 84 Nitta describes the method for manufacturing the semiconductor device according to claim 55, wherein the insulating layer is a single layer film structure or a stacked structure of two insulating films formed on a glass substrate. (Mitinaga 106)

With respect to claim 59 Nitta describes the method for manufacturing the semiconductor device according to claim 58, wherein a thickness of the glass substrate is 0.4 to 0.7 m.m. (Mitinaga col. 13 line 40)

With respect to claims 60 Nitta describes the method for manufacturing the semiconductor device according to claim 58, wherein the glass substrate is 1200 x 1600 mm or 2000 x 2500 mm in length. (Mitinaga col. 13 line 41).

With respect to claims 61,79 Nitta describes describe the method for manufacturing the semiconductor device according to claim 55, 76 wherein the laser beam is a linear laser beam. (Mittinaga col. 11)

With respect to claims 62 Nitta describes the method for manufacturing the semiconductor device according to claim 55, wherein the crystalline semiconductor film is scanned by the laser beam plural times. (Mittinaga col. 12 lines 10-15, 2-10 times)

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With respect to claim 63 Nitta describes the method for manufacturing the semiconductor device according to claim 55, wherein the energy density of the laser beam is larger than 300 to 500 mJ/cm². (Mitanaga col. 12 lines 13-15,)

With respect to claim 64 Nitta describes the method for manufacturing the semiconductor device according to claim 55, wherein the laser beam is one of an excimer laser beam and a YAG laser beam. (Mitanaga col. 10 line 66-excimer)

With respect to claim 65 Nitta describes the method for manufacturing the semiconductor device according to claim 55, wherein the laser beam is a XeCl laser beam. (Mitanaga col. 10 line 66-XeCL).

With respect to claims 66, 80, 85 and 90 Nitta describes the method for manufacturing the semiconductor device according to claim 55, wherein the crystalline semiconductor is heated at 450° to 600° after leveling the surface of the crystalline semiconductor. (Mitanaga col. 12 line 17).

With respect to claim 67 Nitta describe the method for manufacturing the semiconductor device according to claim 55, wherein the crystalline semiconductor is heated by a RTA method after leveling the surface of the crystalline semiconductor. (well known in the art to use RTA method to heat).

With respect to claim 68 Nitta describe the method for manufacturing the semiconductor device according to claim 55, after irradiating the crystalline semiconductor film, a difference between top and bottom points of the surface of the crystalline semiconductor film is 6 nm or less. (Makita col. 20 lines 20-25).

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With respect to claim 69 Nita describes the method for manufacturing the semiconductor device according to claim 55, wherein an energy density of the laser beam is 430 mJ/cm^2 and a pulse width of the laser beam is 30 ns. (Mitinaga col. 5 col. 12 lines 10-15, Sasaki figs. 2,3, col. 4 lines 15-20).

With respect to claims 70 and 81 Nitta describes the method for manufacturing the semiconductor device according to claim 55, further comprising a step of hydrogenating the crystalline semiconductor film. (Sasaki col. 4 lines 20-25).

With respect to claim 71 ,87 & 88 Nitta describes the method for manufacturing the semiconductor device according to claim 55, wherein the gas is jetted to the crystalline semiconductor film from a nozzle. (Sasaki fig. 1)

With respect to claim 72 Nitta describes the method for manufacturing the semiconductor film from below the crystalline semiconductor film.(well known in the art to jet gas from below instead of jetting from sides).

With respect to claim 73 Nitta describes the method for manufacturing the semiconductor device according to claim 55, wherein the semiconductor device is a display device. (Mitanaga col. 15 lines 39-40).

With respect to claims 74 Nitta describes the method for manufacturing the semiconductor device according to claim 55, wherein the semiconductor device is an active matrix type liquid crystal display device. (Mitanaga col. 15 lines 39-40).

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With respect to claim 75 Mitta describes the method for manufacturing the semiconductor device according to claim 55, wherein the semiconductor device is an electronic apparatus selected from the group of a video camera, a digital camera, a rear type or front type projector, a head mount display, a personal computer, a portable information terminal, a mobile computer, a mobile telephone and an electronic book. (Mitanaga col. 15 lines 39-40 LCDs commonly used in digital cameras, video cameras, etc.).

With respect to claim 76 Mitta describes a method for manufacturing a semiconductor device comprising: forming a crystalline semiconductor film over an insulating surface, (Nitta col. 9 lines 2-3, SOI) wherein a surface of the crystalline semiconductor film has a roughness (Makita fig. 15) ;irradiating the crystalline semiconductor film with a laser beam in a gas selected from at least one of a hydrogen and an inert gas (Sasaki col. 2 lines 60-65) so that a difference between top and bottom points of the roughness of the surface of the crystalline semiconductor film is 6 nm or less. (Makita col. 20 lines 20-25).

With respect to claim 82 Mitta describes a method for manufacturing a semiconductor device comprising: forming a crystalline semiconductor film over an insulating surface; (Nitta col. 9 lines 2-3, SOI) irradiating the crystalline semiconductor film with a linear laser beam in a gas selected from at least one era hydrogen and an inert gas to level a surface of the crystalline semiconductor film, (Sasaki col. 2 lines 60-65)wherein the crystalline semiconductor film is hydrogenated by a heating process. (Sasaki col. 3 lines 35-37).

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With respect to claim 86 Mitta describes a method for manufacturing the semiconductor device comprising: disposing a substrate on a stage where a semiconductor film is formed over the substrate; (Sasaki fig.1 #13) floating the substrate over the Stage by supplying a gas to a side of the substrate which faces toward the stage; (Sasaki fig. 1) irradiating the semiconductor film with a linear laser beam while the substrate is floated; (Sasakai fig. 1) and moving the substrate while irradiating the semiconductor film with the linear laser beam. (Sasaki fig.1 #13 moved (rotated by 3)

With respect to claim 89 Mitta describes a method for manufacturing a semiconductor device according to claims 86, wherein the semiconductor film is crystallized by the laser beam. (Mitta col. 9 lines 2-3, SOI) .

With respect to claim 90, Mitta describes a method for manufacturing a semiconductor device according to claims 86, wherein a surface of the semiconductor film is leveled by the laser beam. (Makita col. 20 lines 20-25).

With respect to claim 91Mitta describes a method for manufacturing a semiconductor device according to claims 86, wherein an oxidized film formed on the semiconductor film is abraded by the laser beam. (Sasaki col. 4 lines 1-20).

Response to Arguments

Applicant's arguments with respect to claims 55-91, 99- 100 filed on 10/27/2008 have been considered but not persuasive for the following reasons :

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Applicants arguments are not persuasive as they based on what the applied references individually (Nitta fails to teach, Sasaki does not allegedly teach or Mitnaga allegedly fails to teach whereas the rejection is based on combined teachings).

Applicants' are taking bits and pieces of the applied references and arguing the references allegedly does not particular limitations, however the Applicants' are required to view the entire applied art.

Applicants' first contention that Nitta allegedly does not disclose forming crystalline semiconductor film over an insulating surface is moot and not persuasive because col. 8 line 65 of Nitta states the substrate may be any substrate and it is well known in the art and most widely used substrate is polycrystalline substrate.

Further the applied Sasaki and Mitnaga also teach crystalline substrate.

Applicants' second contention that Nitta allegedly does not teach laser irradiation is also moot and not persuasive because as stated by the applicants' at least the secondary reference Sasaki teaches the laser irradiation and the primary reference need not repeat the teachings of other applied references.

Further under Current 103 standard set by S. Ct. the combination of applied art teaches this limitation.

Applicants' contention based on their limited interpretation that Sasaki only teaches growing InAs and GaAs on InP substrate by VPE is also not persuasive because both the invention and Sasaki teach the CVD (MOCVD) growth of different kinds

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semiconductor substrate while controlling thickness of each layer to desired thickness e.g. atomic scale (Sasaki filed of invention).

Therefore Sasaki and the claimed invention (forming semiconductor film) are in the same filed of invention.

Further Sasaki in fig. 1 and corresponding description make it clear to one ordinarily skilled in the art that it teaches/ suggests “ floating the substrate over the stage an irradiating the semiconductor film (substrate) during floating it.

Therefore all of Applicants’ arguments are not persuasive and all independent claims 55,76,82 and 86 are rejected.

Applicants’ alleged that dependent claims were allowable because independent claim are allegedly allowable.

However as seen above, independent claims are not allowable, therefore dependent claims are also not allowable.

1. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

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extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to STEVEN H. RAO whose telephone number is (571)272-1718. The examiner can normally be reached on 8.30-5.30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on 571-272-1714. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Steven H Rao/
Examiner, Art Unit 2814

/Long Pham/
Primary Examiner, Art Unit 2814

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